Presentation To

RMRA Alternatives Development Workshop

Feasibility Study Update

January 23, 2009

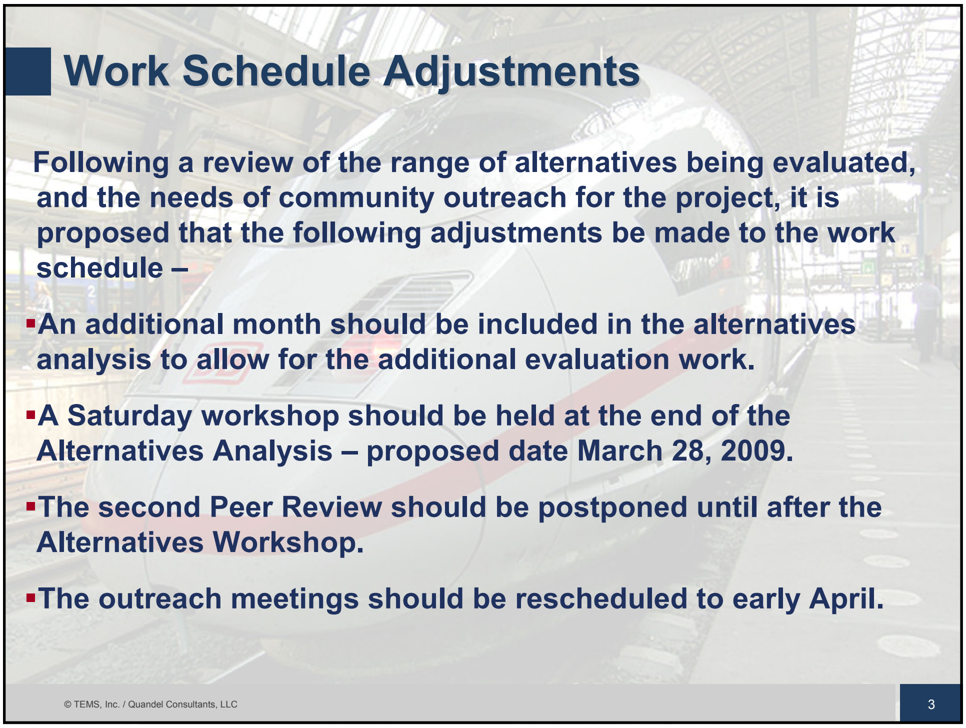
High Speed Rail Feasibility Study

TEMS, Inc. / Quandel Consultants, LLC

Presentation Outline

- Work Schedule Update
- Document Status
- Public Involvement Update
- Alternatives Analysis
  - Engineering Update: Routes Development Status
  - Operations Update
  - Ridership Model Development

Work Schedule Update



Work Schedule Adjustments

Following a review of the range of alternatives being evaluated, and the needs of community outreach for the project, it is proposed that the following adjustments be made to the work schedule –

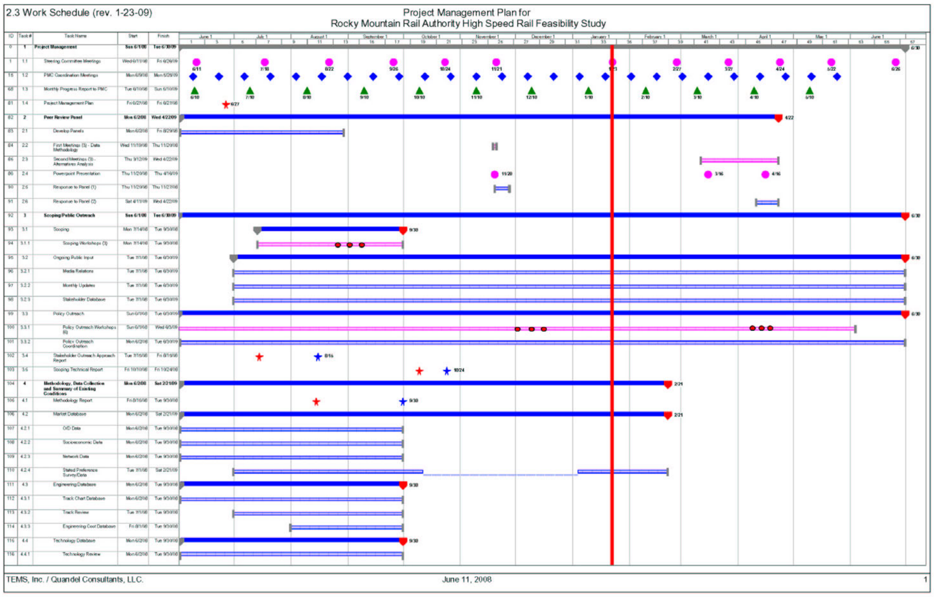
- An additional month should be included in the alternatives analysis to allow for the additional evaluation work.
- A Saturday workshop should be held at the end of the Alternatives Analysis – proposed date March 28, 2009.
- The second Peer Review should be postponed until after the Alternatives Workshop.
- The outreach meetings should be rescheduled to early April.

Work Schedule Adjustments

The revised work schedule also allows a number of incremental factors to be accounted for. These include –

- Peer Panel data reviews of demand model.
- Some engineering data must be converted from metric units.
- Demand data format issues.
- Finalization of Denver routes and sensitivities.
- Community information requests.
- Technology review and selection.

Study Work Schedule: Tasks 1 thru 4.4.1



2.3 Work Schedule (rev. 1-23-09)

Project Management Plan for
Rocky Mountain Rail Authority High Speed Rail Feasibility Study

ID	Task #	Task Name	Start	Finish
0	**1**	**Project Management**	**Sun 6/1/08**	**Tue 6/30/09**
1	1.1	Steering Committee Meetings	Wed 6/11/08	Fri 6/26/09
15	1.2	PMC Coordination Meetings	Mon 6/9/08	Mon 6/29/09
68	1.3	Monthly Progress Report to PMC	Tue 6/10/08	Sun 6/10/09
81	1.4	Project Management Plan	Fri 6/27/08	Fri 6/27/08
82	**2**	**Peer Review Panel**	**Mon 6/2/08**	**Wed 4/22/09**
83	2.1	Develop Panels	Mon 6/2/08	Fri 8/29/08
84	2.2	First Meetings (3) - Data Methodology	Wed 11/19/08	Thu 11/20/08
86	2.3	Second Meetings (3) - Alternatives Analysis	Thu 3/12/09	Wed 4/22/09
89	2.4	Powerpoint Presentation	Thu 11/20/08	Thu 4/16/09
90	2.5	Response to Panel (1)	Thu 11/20/08	Thu 11/27/08
91	2.6	Response to Panel (2)	Sat 4/11/09	Wed 4/22/09
92	**3**	**Scoping/Public Outreach**	**Sun 6/1/08**	**Tue 6/30/09**
93	3.1	Scoping	Mon 7/14/08	Tue 9/30/08
94	3.1.1	Scoping Workshops (3)	Mon 7/14/08	Tue 9/30/08
95	3.2	Ongoing Public Input	Tue 7/1/08	Tue 6/30/09
96	3.2.1	Media Relations	Tue 7/1/08	Tue 6/30/09
97	3.2.2	Monthly Updates	Tue 7/1/08	Tue 6/30/09
98	3.2.3	Stakeholder Database	Tue 7/1/08	Tue 6/30/09
99	3.3	Policy Outreach	Sun 6/1/08	Tue 6/30/09
100	3.3.1	Policy Outreach Workshops (6)	Sun 6/1/08	Wed 6/3/09
101	3.3.2	Policy Outreach Coordination	Mon 6/2/08	Tue 6/30/09
102	3.4	Stakeholder Outreach Approach Report	Tue 7/15/08	Fri 8/15/08
103	3.6	Scoping Technical Report	Fri 10/10/08	Fri 10/24/08
104	**4**	**Methodology, Data Collection and Summary of Existing Conditions**	**Mon 6/2/08**	**Sat 2/21/09**
105	4.1	Methodology Report	Fri 8/15/08	Tue 9/30/08
106	4.2	Market Database	Mon 6/2/08	Sat 2/21/09
107	4.2.1	O/D Data	Mon 6/2/08	Tue 9/30/08
108	4.2.2	Socioeconomic Data	Mon 6/2/08	Tue 9/30/08
109	4.2.3	Network Data	Mon 6/2/08	Tue 9/30/08
110	4.2.4	Stated Preference Survey/Data	Tue 7/1/08	Sat 2/21/09
111	4.3	Engineering Database	Mon 6/2/08	Tue 9/30/08
112	4.3.1	Track Chart Database	Mon 6/2/08	Tue 9/30/08
113	4.3.2	Track Review	Tue 7/1/08	Tue 9/30/08
114	4.3.3	Engineering Cost Database	Fri 8/1/08	Tue 9/30/08
115	4.4	Technology Database	Mon 6/2/08	Tue 9/30/08
116	4.4.1	Technology Review	Mon 6/2/08	Tue 9/30/08

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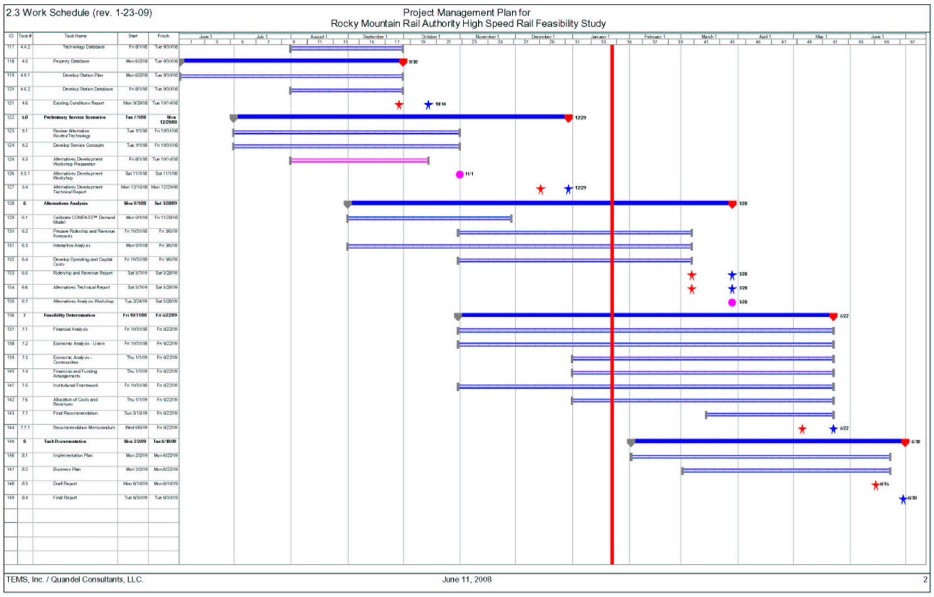
Study Work Schedule: Tasks 4.4.2 thru 8.4



2.3 Work Schedule (rev. 1-23-09)

Project Management Plan for
Rocky Mountain Rail Authority High Speed Rail Feasibility Study

ID	Task #	Task Name	Start	Finish
117	4.4.2	Technology Database	Fri 8/1/08	Tue 9/30/08
118	4.5	Property Database	Mon 6/2/08	Tue 9/30/08
119	4.5.1	Develop Station Plan	Mon 6/2/08	Tue 9/30/08
120	4.5.2	Develop Station Database	Fri 8/1/08	Tue 9/30/08
121	4.6	Existing Conditions Report	Mon 9/29/08	Tue 10/14/08
122	**5.0**	**Preliminary Service Scenarios**	**Tue 7/1/08**	**Mon 12/29/08**
123	5.1	Review Alternative Routes/Technology	Tue 7/1/08	Fri 10/31/08
124	5.2	Develop Service Concepts	Tue 7/1/08	Fri 10/31/08
125	5.3	Alternatives Development Workshop Preparation	Fri 8/1/08	Tue 10/14/08
126	5.3.1	Alternatives Development Workshop	Sat 11/1/08	Sat 11/1/08
127	5.4	Alternatives Development Technical Report	Mon 12/15/08	Mon 12/29/08
128	**6**	**Alternatives Analysis**	**Mon 9/1/08**	**Sat 3/28/09**
129	6.1	Calibrate COMPASS™ Demand Model	Mon 9/1/08	Fri 11/28/08
130	6.2	Prepare Ridership and Revenue Forecasts	Fri 10/31/08	Fri 3/6/09
131	6.3	Interactive Analysis	Mon 9/1/08	Fri 3/6/09
132	6.4	Develop Operating and Capital Costs	Fri 10/31/08	Fri 3/6/09
133	6.5	Ridership and Revenue Report	Sat 3/7/09	Sat 3/28/09
134	6.6	Alternatives Technical Report	Sat 3/7/09	Sat 3/28/09
135	6.7	Alternatives Analysis Workshop	Tue 2/24/09	Sat 3/28/09
136	**7**	**Feasibility Determination**	**Fri 10/31/08**	**Fri 5/22/09**
137	7.1	Financial Analysis	Fri 10/31/08	Fri 5/22/09
138	7.2	Economic Analysis - Users	Fri 10/31/08	Fri 5/22/09
139	7.3	Economic Analysis - Communities	Thu 1/1/09	Fri 5/22/09
140	7.4	Financing and Funding Arrangements	Thu 1/1/09	Fri 5/22/09
141	7.5	Institutional Framework	Fri 10/31/08	Fri 5/22/09
142	7.6	Allocation of Costs and Revenues	Thu 1/1/09	Fri 5/22/09
143	7.7	Final Recommendation	Sun 3/15/09	Fri 5/22/09
144	7.7.1	Recommendation Memorandum	Wed 5/6/09	Fri 5/22/09
145	**8**	**Task Documentation**	**Mon 2/2/09**	**Tue 6/30/09**
146	8.1	Implementation Plan	Mon 2/2/09	Mon 6/22/09
147	8.2	Business Plan	Mon 3/2/09	Mon 6/22/09
148	8.3	Draft Report	Mon 6/15/09	Mon 6/15/09
149	8.4	Final Report	Tue 6/30/09	Tue 6/30/09

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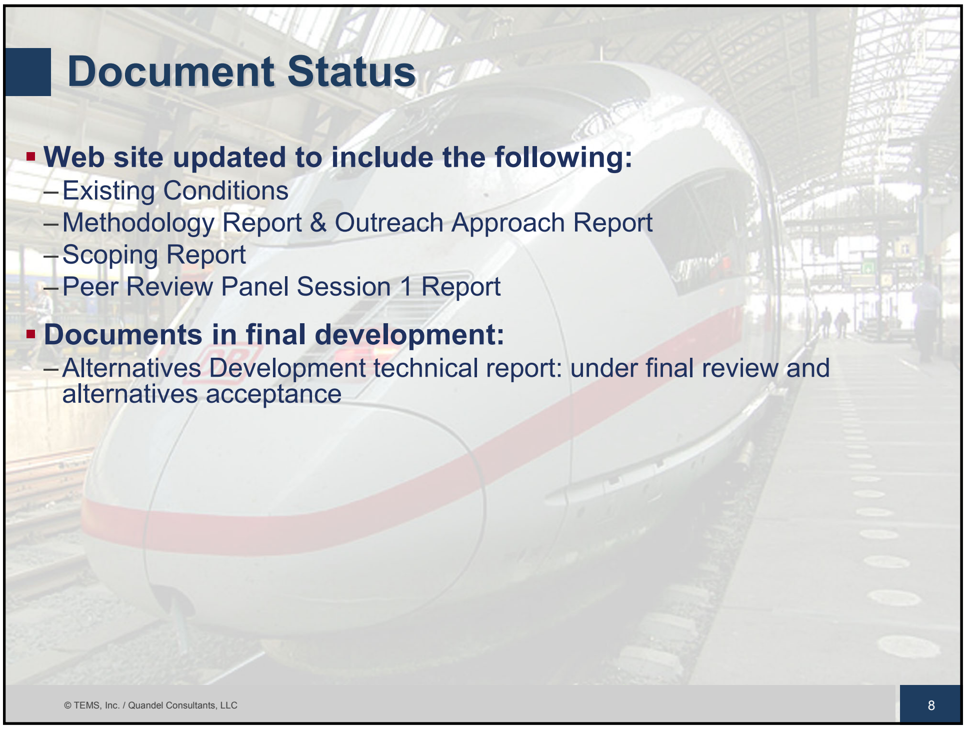
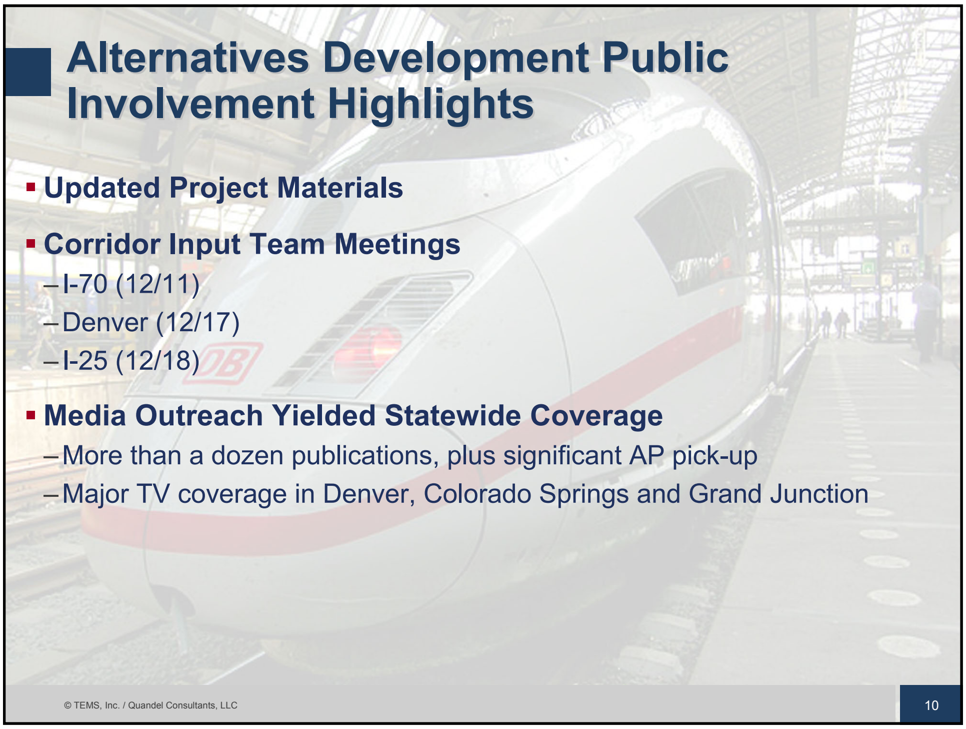
Document Status



Document Status

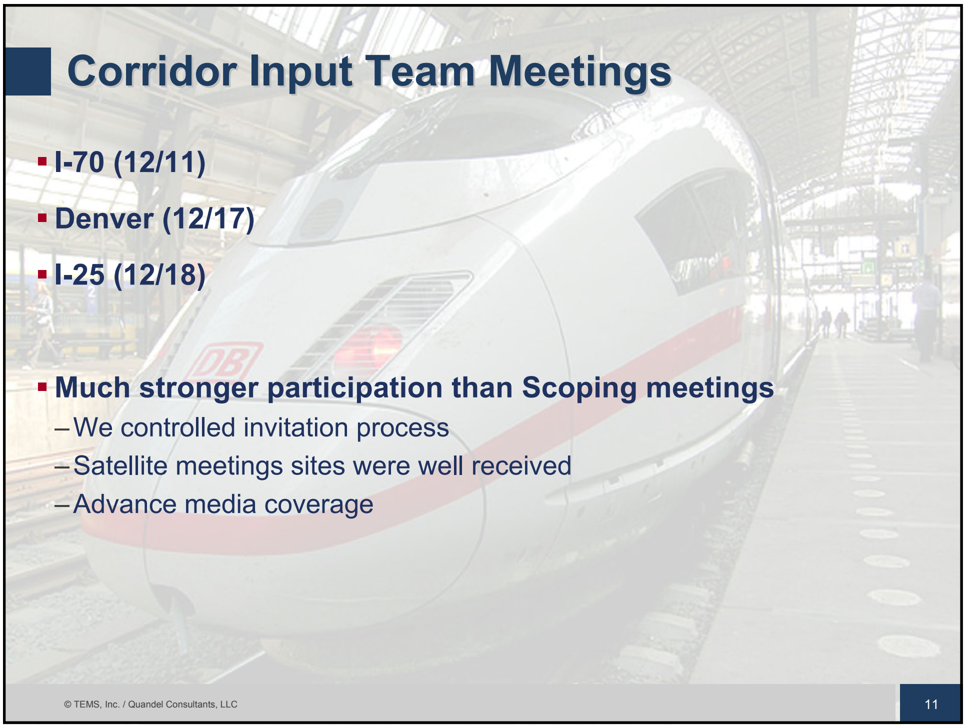
- **Web site updated to include the following:**
  - Existing Conditions
  - Methodology Report & Outreach Approach Report
  - Scoping Report
  - Peer Review Panel Session 1 Report
- **Documents in final development:**
  - Alternatives Development technical report: under final review and alternatives acceptance

Public Involvement Update



Alternatives Development Public Involvement Highlights

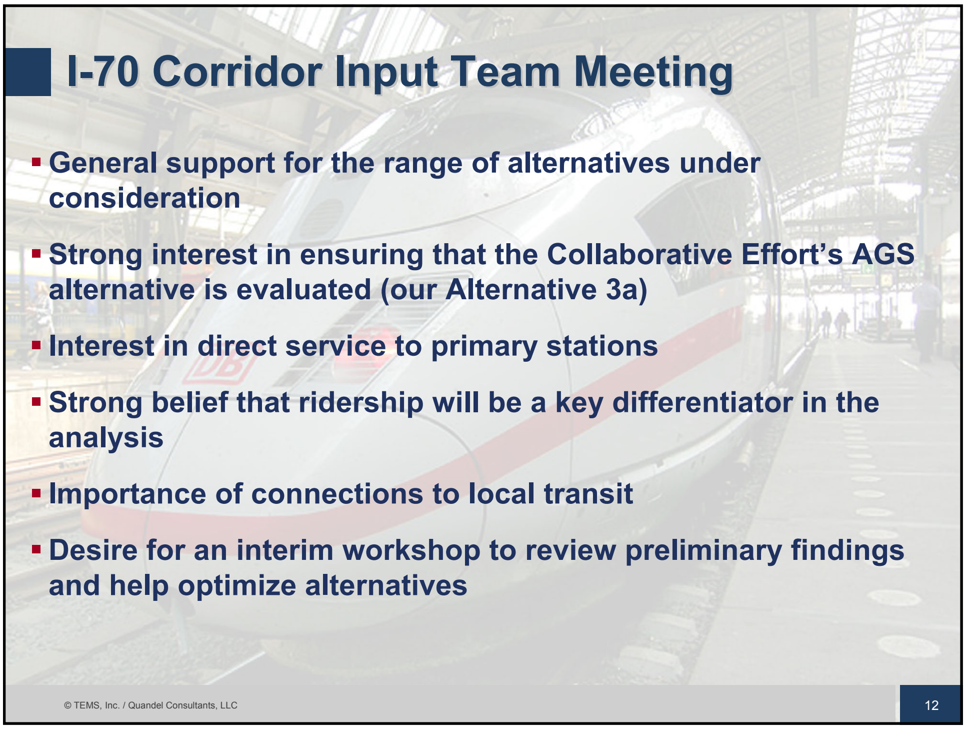
- **Updated Project Materials**
- **Corridor Input Team Meetings**
  - I-70 (12/11)
  - Denver (12/17)
  - I-25 (12/18)
- **Media Outreach Yielded Statewide Coverage**
  - More than a dozen publications, plus significant AP pick-up
  - Major TV coverage in Denver, Colorado Springs and Grand Junction



Corridor Input Team Meetings

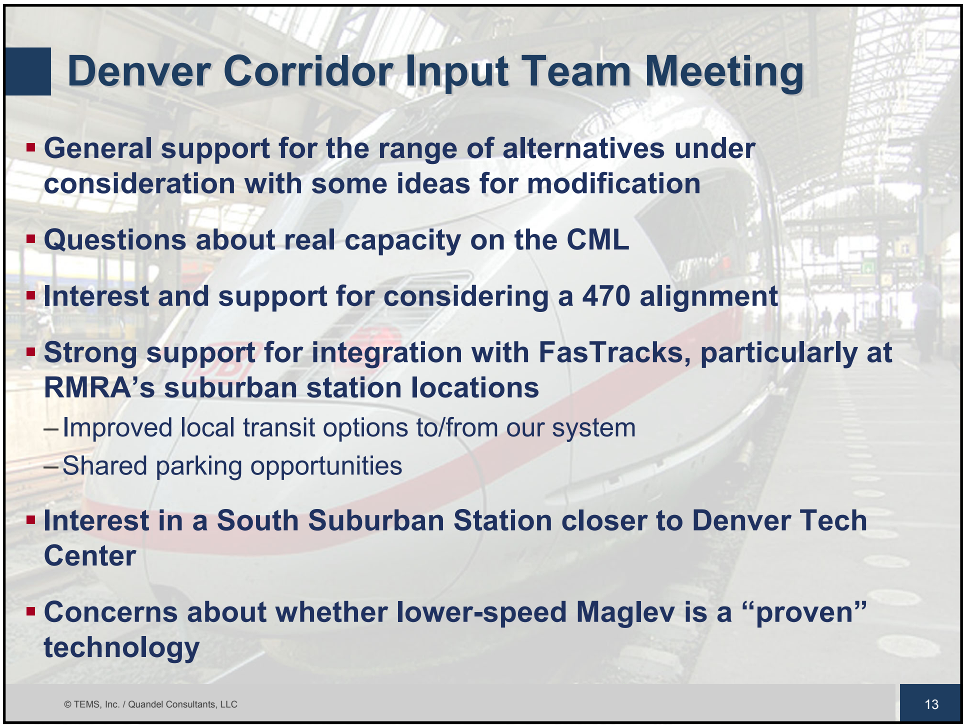
- **I-70 (12/11)**
- **Denver (12/17)**
- **I-25 (12/18)**

- **Much stronger participation than Scoping meetings**
  - We controlled invitation process
  - Satellite meetings sites were well received
  - Advance media coverage



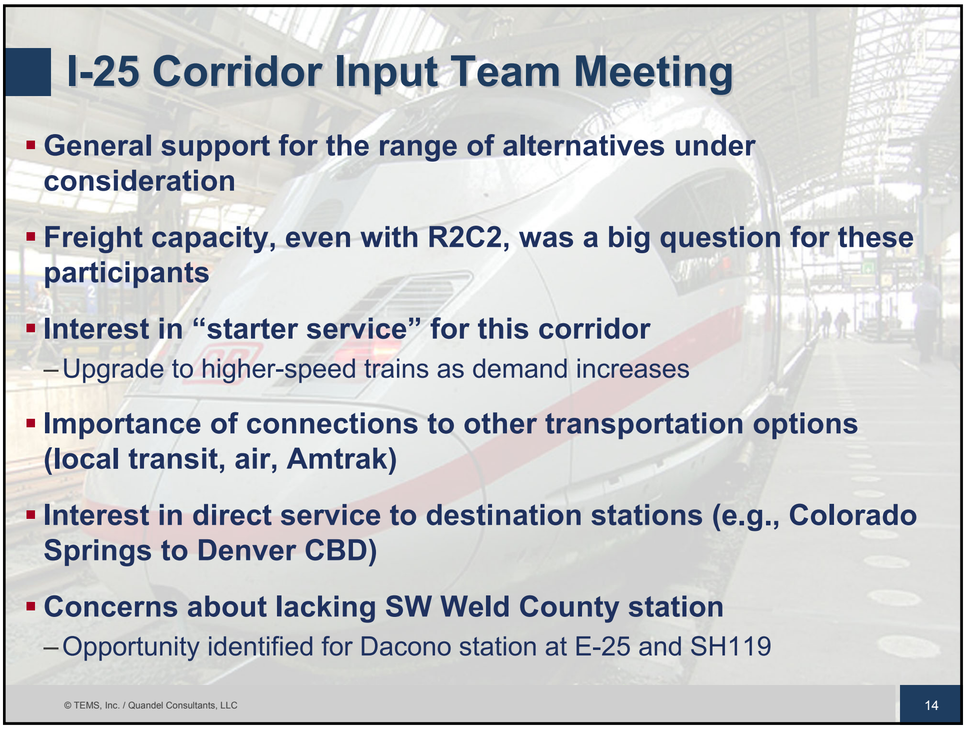
I-70 Corridor Input Team Meeting

- General support for the range of alternatives under consideration
- Strong interest in ensuring that the Collaborative Effort's AGS alternative is evaluated (our Alternative 3a)
- Interest in direct service to primary stations
- Strong belief that ridership will be a key differentiator in the analysis
- Importance of connections to local transit
- Desire for an interim workshop to review preliminary findings and help optimize alternatives



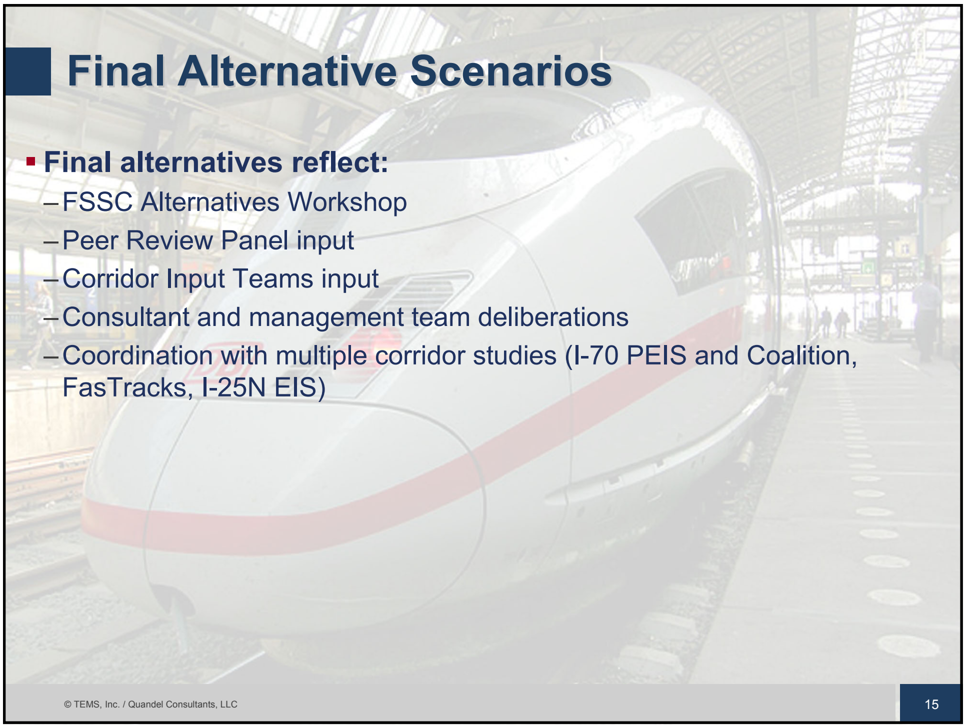
Denver Corridor Input Team Meeting

- General support for the range of alternatives under consideration with some ideas for modification
- Questions about real capacity on the CML
- Interest and support for considering a 470 alignment
- Strong support for integration with FasTracks, particularly at RMRA's suburban station locations
  - Improved local transit options to/from our system
  - Shared parking opportunities
- Interest in a South Suburban Station closer to Denver Tech Center
- Concerns about whether lower-speed Maglev is a "proven" technology



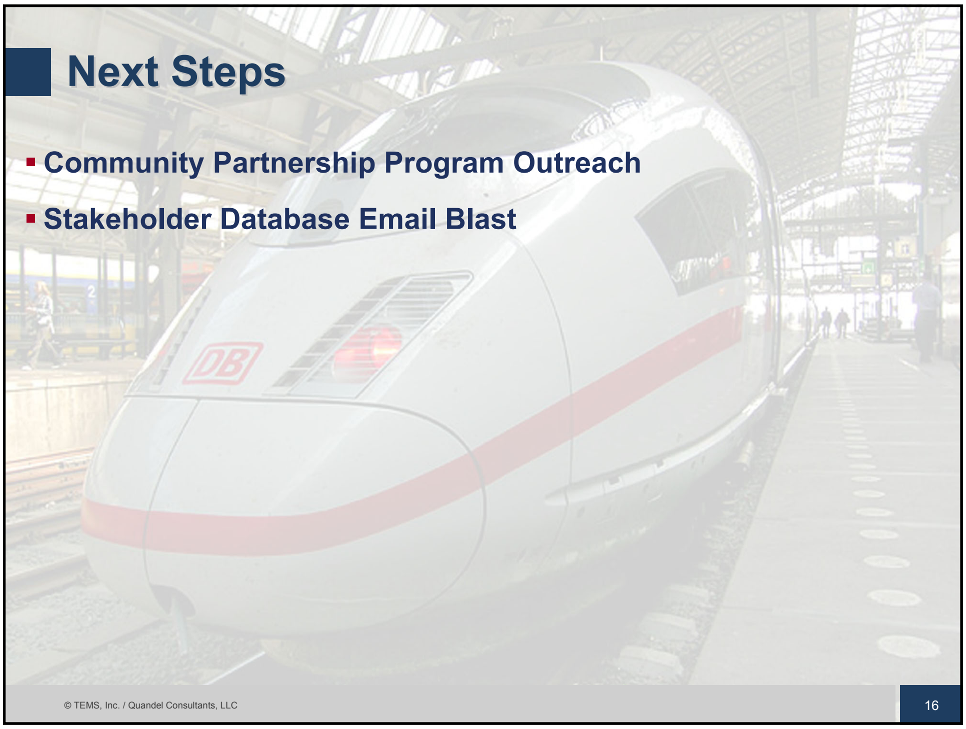
I-25 Corridor Input Team Meeting

- **General support for the range of alternatives under consideration**
- **Freight capacity, even with R2C2, was a big question for these participants**
- **Interest in “starter service” for this corridor**
  - Upgrade to higher-speed trains as demand increases
- **Importance of connections to other transportation options (local transit, air, Amtrak)**
- **Interest in direct service to destination stations (e.g., Colorado Springs to Denver CBD)**
- **Concerns about lacking SW Weld County station**
  - Opportunity identified for Dacono station at E-25 and SH119



Final Alternative Scenarios

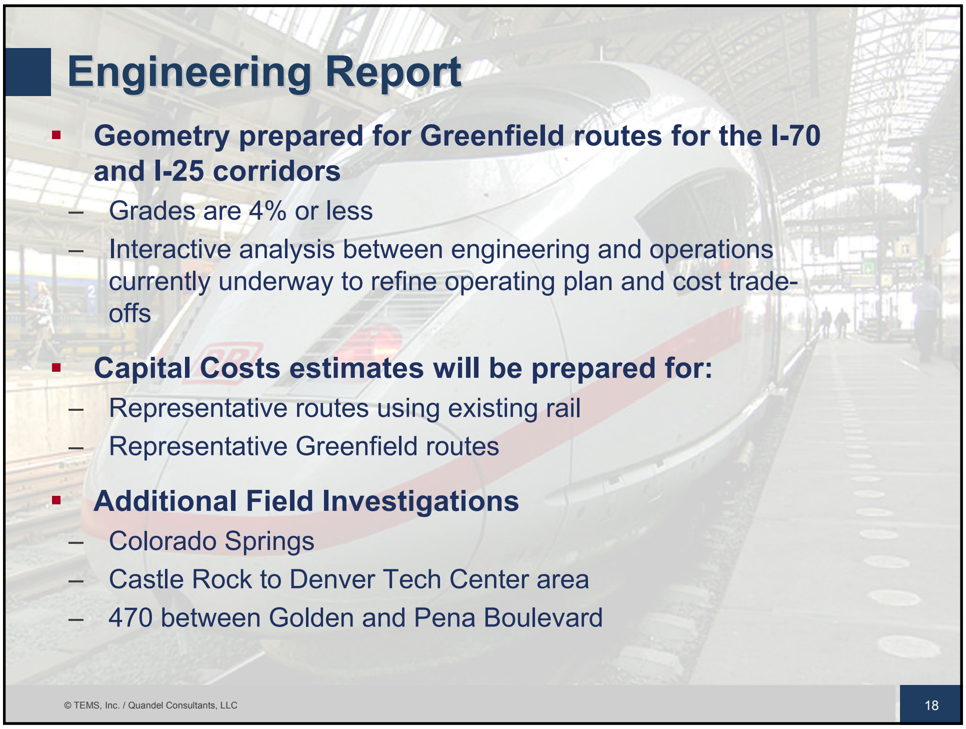
- **Final alternatives reflect:**
  - FSSC Alternatives Workshop
  - Peer Review Panel input
  - Corridor Input Teams input
  - Consultant and management team deliberations
  - Coordination with multiple corridor studies (I-70 PEIS and Coalition, FasTracks, I-25N EIS)



Next Steps

- Community Partnership Program Outreach
- Stakeholder Database Email Blast

Engineering Update



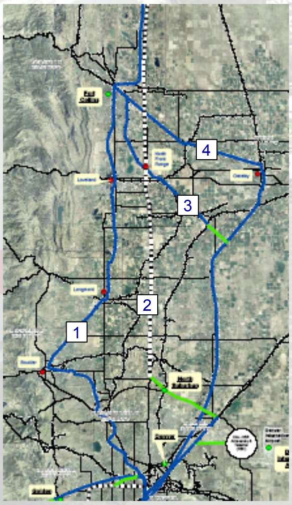
Engineering Report

- **Geometry prepared for Greenfield routes for the I-70 and I-25 corridors**
  - Grades are 4% or less
  - Interactive analysis between engineering and operations currently underway to refine operating plan and cost trade-offs
- **Capital Costs estimates will be prepared for:**
  - Representative routes using existing rail
  - Representative Greenfield routes
- **Additional Field Investigations**
  - Colorado Springs
  - Castle Rock to Denver Tech Center area
  - 470 between Golden and Pena Boulevard

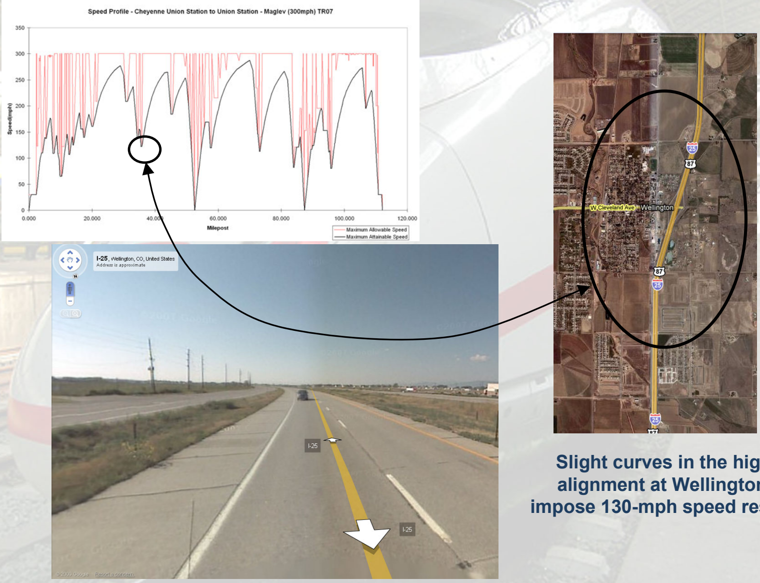
Operations Update

I-25 North Corridor Operations

- **I-25 used for Maglev both north and south of Fort Collins**
- **Four rail route options between Fort Collins and Denver:**
  1. Boulder
  2. I-25
  3. Milliken
  4. Greeley
- **North of Fort Collins:**
  - BNSF used for Rail Options
- **Boulder takes significantly longer than the other routes**

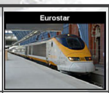


I-25 North – Maglev Simulation



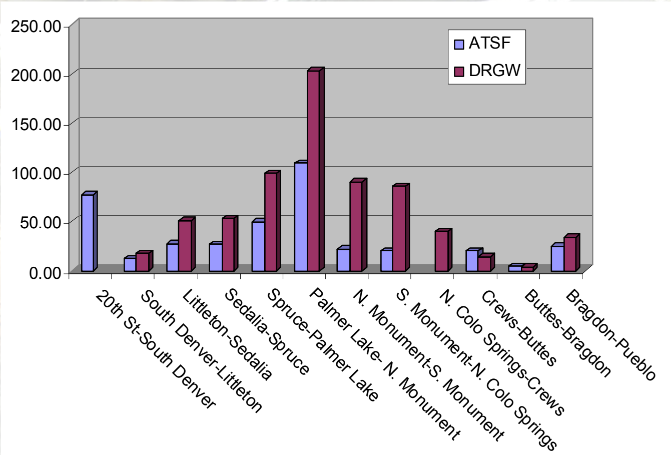
Slight curves in the highway alignment at Wellington, CO impose 130-mph speed restriction

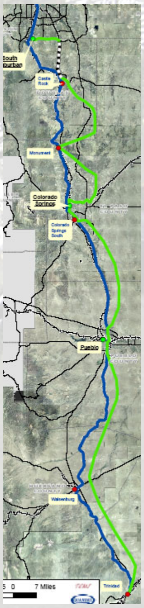
I-25 North – Preliminary Operational Assessment

Technology		Conventional Amtrak 	Talgo T21 	Proposed Colorado Maglev 	Eurostar 	ICE EMU 		Transrapid Maglev
Max Speed		79-mph (Non tilting)	110-mph (Tilting)	125-mph	150-mph (Tilting)	150-mph (Non tilting)	220-mph (Tilting)	300-mph
SUMMARY* *Cheyenne - to - Denver	***Best Combo*** 114 mi	***2:05***	***1:27***	***1:15***	***1:15***	***1:20***	***1:07***	***1:05***
Cheyenne - to - Fort Collins	**BNSF** 46 mi	0:53	0:38	-	0:35	0:38	-	-
	Via I-25 46 mi	-	-	0:30	-	-	0:25	0:23
Fort Collins - to - Denver	**Greeley** 76 mi	1:21	0:55	-	0:45	0:47	-	-
	Milliken 68 mi	1:12	0:49	-	0:40	0:42	-	-
	I-25 68 mi	1:12	0:49	0:45	-	-	0:42	0:42
	Boulder 72 mi	1:56	1:22	-	1:19	1:22	-	-

I-25 South – Joint Line Operations

Curvature Degrees per Mile, Denver to Pueblo





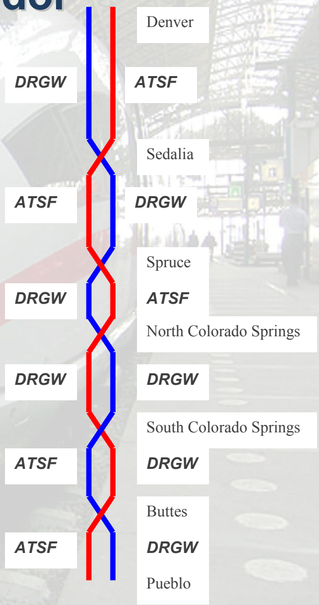
Segment-by-Segment Analysis shows that the former ATSF track has superior geometry everywhere, except for Crews to Buttes segment

I-25 South – Joint Line Corridor

- **Rail Corridor Consists of two tracks – former DRGW (UP) and ATSF (BNSF) alignment**
  - Proposing to “undo” USRA-era mix and match that has been in place since 1918
  - This becomes the starting point for a further program of curve easements
  - Almost completely separate freight from passenger operations
- **Greenfield option still uses CML for access to downtown Denver**
  - An alternative to CML will be assessed as a sensitivity

🟥 Passenger Alignment

🟦 Freight Alignment



Denver

DRGW ATSF

Sedalia

ATSF DRGW

Spruce

DRGW ATSF

North Colorado Springs

DRGW DRGW

South Colorado Springs

ATSF DRGW

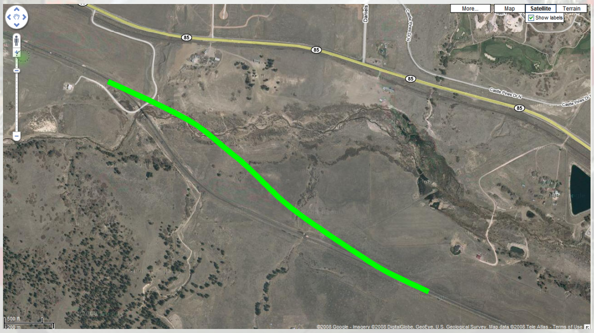
Buttes

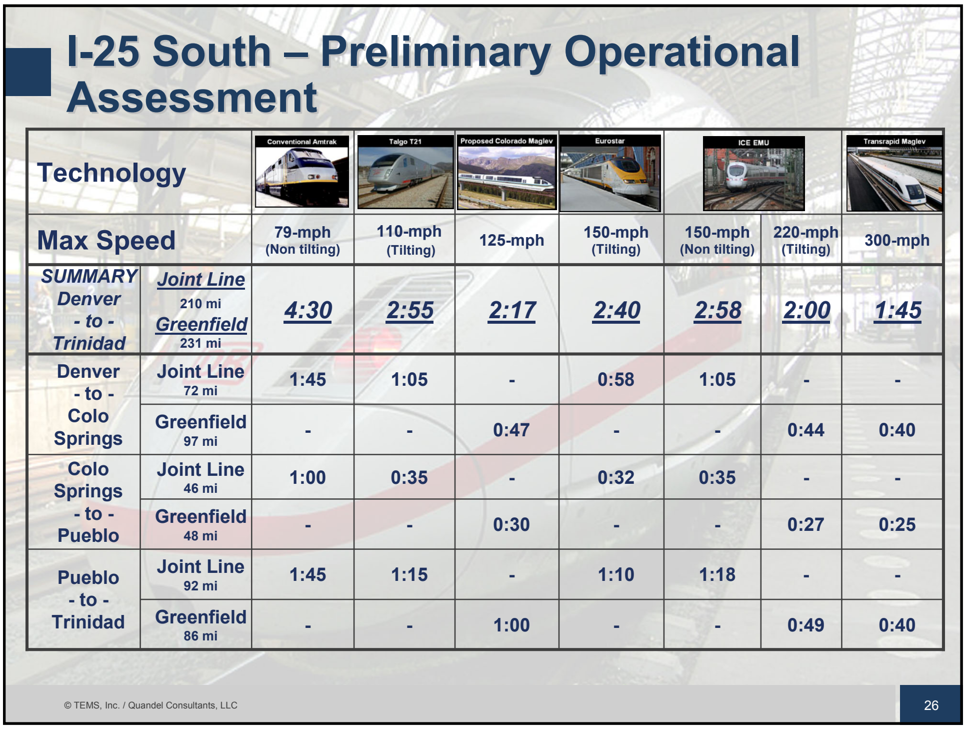
ATSF DRGW

Pueblo

I-25 South – Joint Line Corridor

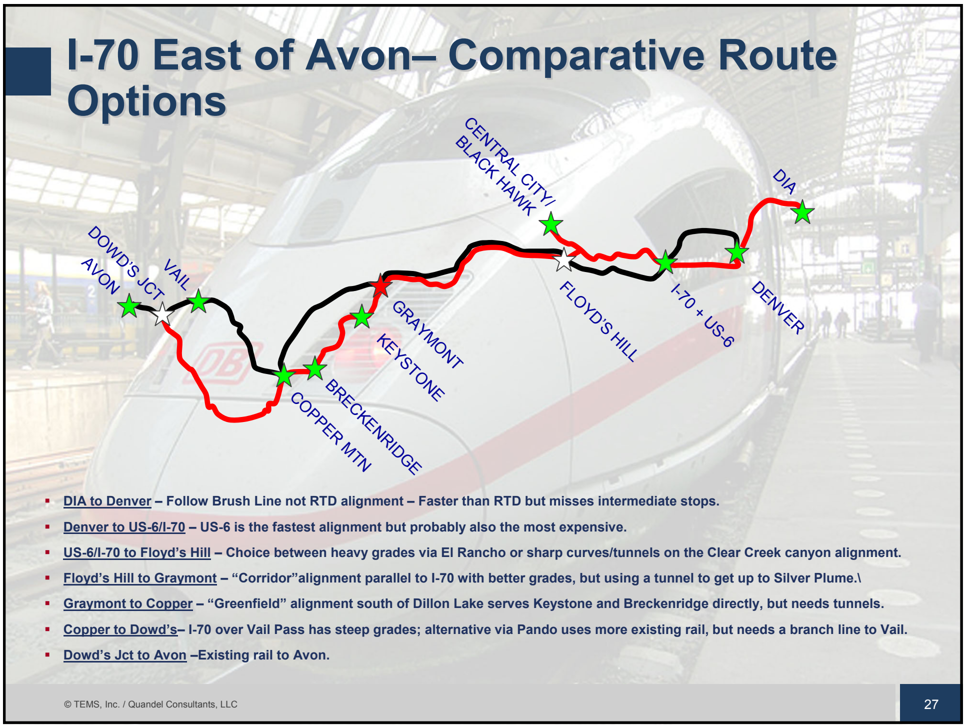
- **A program of 53 curve easements has been proposed for improving the passenger line to 110-mph standards from Denver to Pueblo**





I-25 South – Preliminary Operational Assessment

Technology		Conventional Amtrak	Talgo T21	Proposed Colorado Maglev	Eurostar	ICE EMU		Transrapid Maglev
Max Speed		79-mph (Non tilting)	110-mph (Tilting)	125-mph	150-mph (Tilting)	150-mph (Non tilting)	220-mph (Tilting)	300-mph
SUMMARY* *Denver - to - Trinidad	***Joint Line*** 210 mi ***Greenfield*** 231 mi	***4:30***	***2:55***	***2:17***	***2:40***	***2:58***	***2:00***	***1:45***
Denver - to - Colo Springs	**Joint Line** 72 mi	1:45	1:05	-	0:58	1:05	-	-
	Greenfield 97 mi	-	-	0:47	-	-	0:44	0:40
Colo Springs - to - Pueblo	**Joint Line** 46 mi	1:00	0:35	-	0:32	0:35	-	-
	Greenfield 48 mi	-	-	0:30	-	-	0:27	0:25
Pueblo - to - Trinidad	**Joint Line** 92 mi	1:45	1:15	-	1:10	1:18	-	-
	Greenfield 86 mi	-	-	1:00	-	-	0:49	0:40



I-70 East of Avon– Comparative Route Options

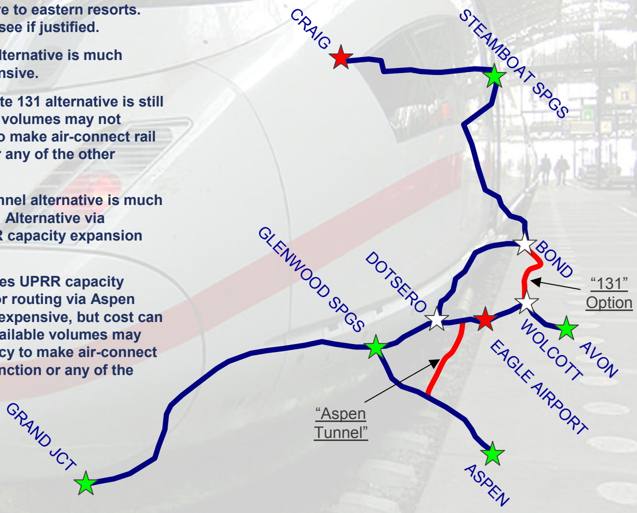
- DIA to Denver – Follow Brush Line not RTD alignment – Faster than RTD but misses intermediate stops.
- Denver to US-6/I-70 – US-6 is the fastest alignment but probably also the most expensive.
- US-6/I-70 to Floyd's Hill – Choice between heavy grades via El Rancho or sharp curves/tunnels on the Clear Creek canyon alignment.
- Floyd's Hill to Graymont – "Corridor"alignment parallel to I-70 with better grades, but using a tunnel to get up to Silver Plume.\
- Graymont to Copper – "Greenfield" alignment south of Dillon Lake serves Keystone and Breckenridge directly, but needs tunnels.
- Copper to Dowd's– I-70 over Vail Pass has steep grades; alternative via Pando uses more existing rail, but needs a branch line to Vail.
- Dowd's Jct to Avon –Existing rail to Avon.

I-70 East of Avon – Preliminary Operational Assessment

Technology						
Max Speed		125-mph	150-mph (Tilting)	150-mph (Non tilting)	220-mph (Tilting)	300-mph
SUMMARY DIA - to - Avon	*I-70* 135 mi	***2:13***	***2:25***	***2:45***	***2:25***	***2:10***
DIA - to - Denver	BNSF 23 mi	0:16	0:13	0:13	0:13	0:13
Denver - to - Copper	I-70 80 mi	1:20	1:30	1:45	1:30	1:20
Copper - to - Vail	I-70 22 mi	0:25	0:27	0:30	0:27	0:25
Vail - to - Avon	UP RR 10 mi	0:12	0:15	0:17	0:15	0:12
Denver - to - Black Hawk	US-6 35 mi	0:53	0:54	0:58	0:54	0:53

I-70 West of Avon– Route Options

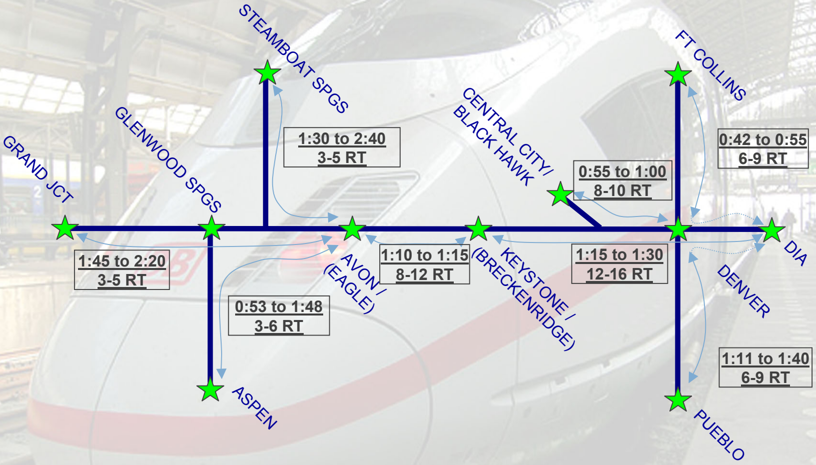
- **Eagle Airport to Avon** – Extending Avon service west to Eagle would likely provide enough train frequency to make air connect service attractive to eastern resorts. Volumes need to be evaluated to see if justified.
- **Avon to Steamboat** – Route 131 alternative is much faster, but will likely be very expensive.
- **Eagle Airport to Steamboat** – Route 131 alternative is still faster than via Dotsero. Available volumes may not support enough train frequency to make air-connect rail service attractive to Steamboat or any of the other western destinations.
- **Avon/Eagle to Aspen** – Aspen Tunnel alternative is much faster but will likely be expensive. Alternative via Glenwood Springs requires UPRR capacity expansion and will also be expensive.
- **Avon/Eagle to Grand Jct** – Requires UPRR capacity expansion in Glenwood Canyon or routing via Aspen Tunnel. Either alternative will be expensive, but cost can be shared with Aspen service. Available volumes may not support enough train frequency to make air-connect rail service attractive to Grand Junction or any of the other western destinations.



I-70 West of Avon – Preliminary Operational Assessment

Technology		Proposed Colorado Maglev 	Eurostar 	ICE EMU 		Transrapid Maglev
Max Speed		125-mph	150-mph (Tilting)	150-mph (Non tilting)	220-mph (Tilting)	300-mph
Avon - to - Grand Jct	UP RR 141 mi	***1:42***	***2:00***	***2:20***	***1:45***	***1:37***
Avon - to - Glenwood	UP RR 52 mi	0:42	0:55	1:05	0:45	0:42
Glenwood - to - Grand Jct	UP RR 89 mi	1:00	1:05	1:15	1:00	0:55
Avon - to - Steamboat	Wolcott 90 mi	1:20	1:40	1:50	1:30	1:20
	Dotsero 133 mi	***2:10***	***2:25***	***2:40***	***2:15***	***2:10***
Avon - to - Aspen	UP RR 89 mi	***1:15***	***1:38***	***1:48***	***1:22***	***1:15***
	Tunnel 65 mi	0:50	1:00	1:05	0:53	0:50

Preliminary Rail Operating Plan*



STEAMBOAT SPGS

GLENWOOD SPGS

GRAND JCT

CENTRAL CITY/ BLACK HAWK

FT COLLINS

AVON / (EAGLE)

KEYSTONE / (BRECKENRIDGE)

DIA

DENVER

ASPEN

PUEBLO

1:30 to 2:40
3-5 RT

0:55 to 1:00
8-10 RT

0:42 to 0:55
6-9 RT

1:45 to 2:20
3-5 RT

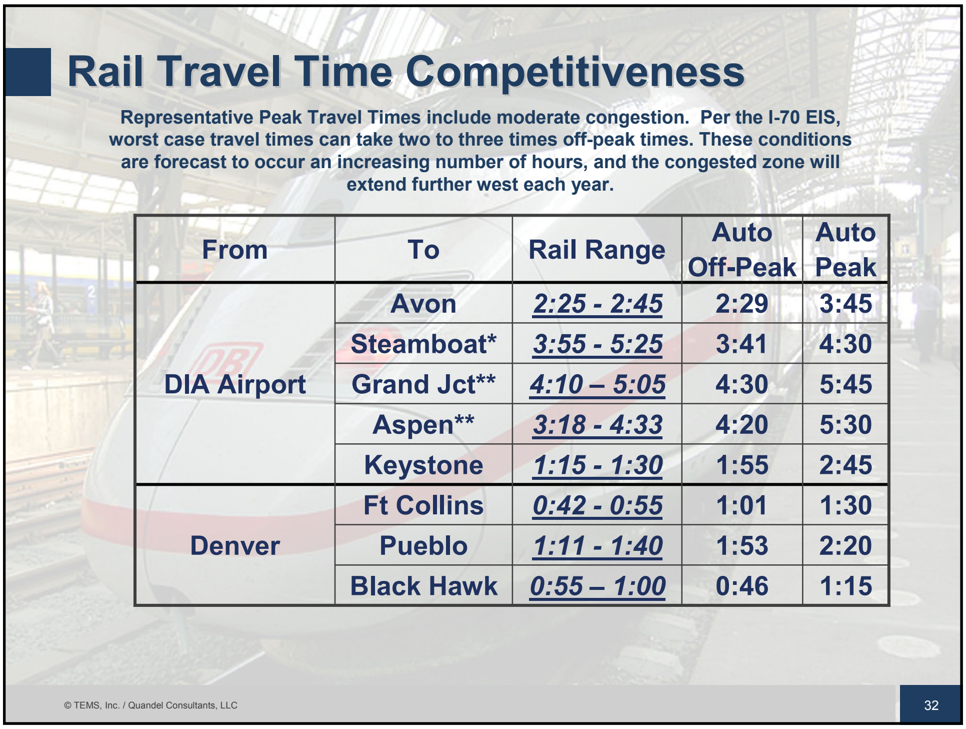
1:10 to 1:15
8-12 RT

1:15 to 1:30
12-16 RT

0:53 to 1:48
3-6 RT

1:11 to 1:40
6-9 RT

* Schedule Times and Likely Frequencies, based on the 110-mph or better Rail Options



Rail Travel Time Competitiveness

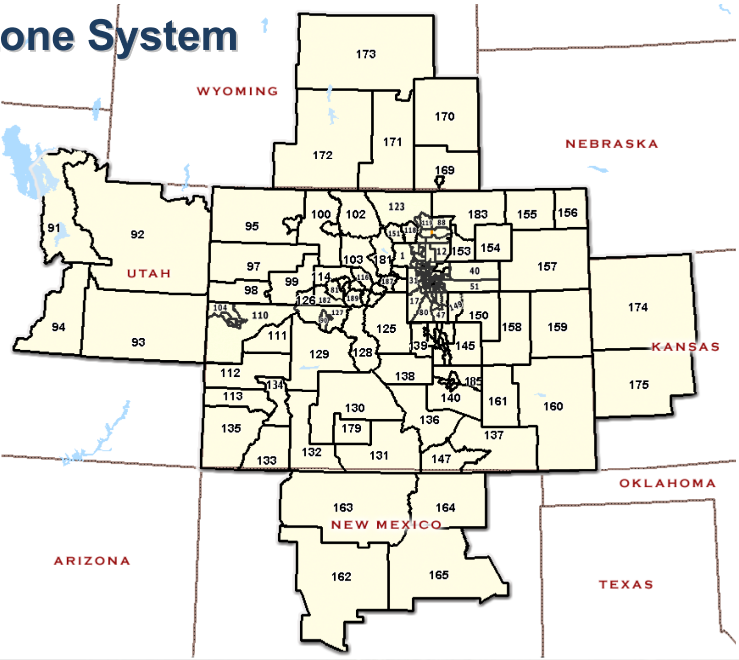
Representative Peak Travel Times include moderate congestion. Per the I-70 EIS, worst case travel times can take two to three times off-peak times. These conditions are forecast to occur an increasing number of hours, and the congested zone will extend further west each year.

From	To	Rail Range	Auto Off-Peak	Auto Peak
DIA Airport	Avon	2:25 - 2:45	2:29	3:45
	Steamboat*	3:55 - 5:25	3:41	4:30
	Grand Jct**	4:10 – 5:05	4:30	5:45
	Aspen**	3:18 - 4:33	4:20	5:30
	Keystone	1:15 - 1:30	1:55	2:45
Denver	Ft Collins	0:42 - 0:55	1:01	1:30
	Pueblo	1:11 - 1:40	1:53	2:20
	Black Hawk	0:55 – 1:00	0:46	1:15

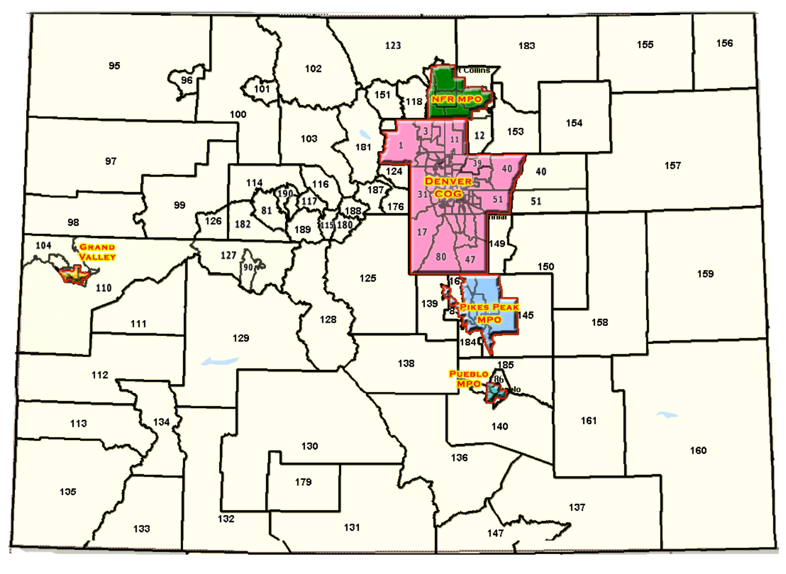
Ridership Update

Zone System

RMRA Zone System

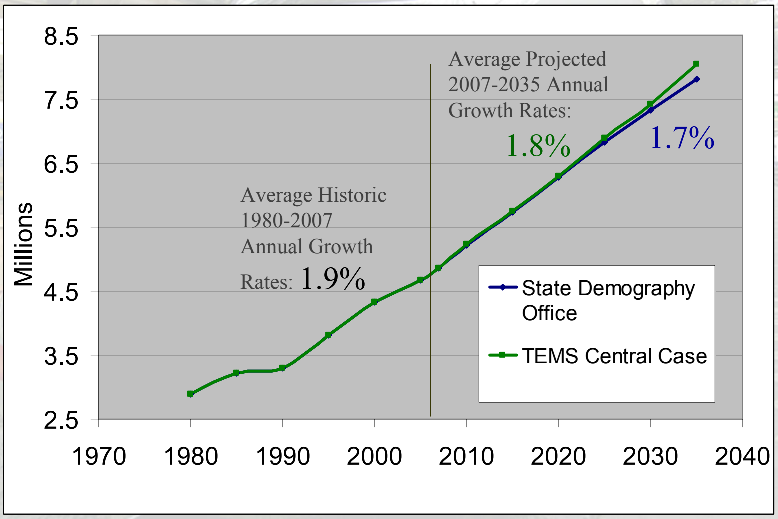


Colorado MPOs



Socioeconomic Scenarios

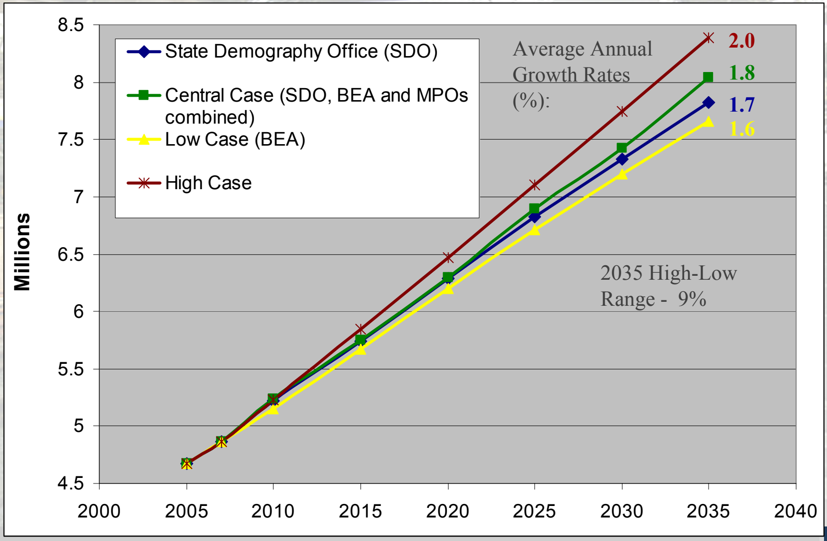
Historical and Projected Population for the State of Colorado (1980-2035)



Average Historic 1980-2007 Annual Growth Rates: 1.9%

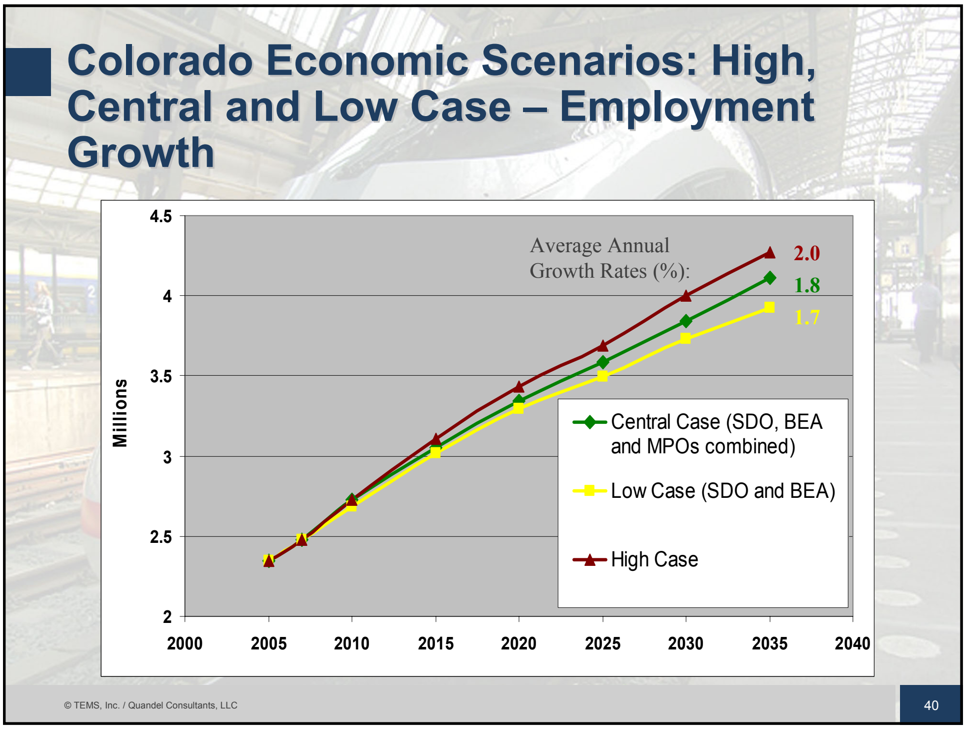
Average Projected 2007-2035 Annual Growth Rates: 1.8% 1.7%

Colorado Economic Scenarios: State Demography Office & TEMS High, Central and Low Case – Population Growth

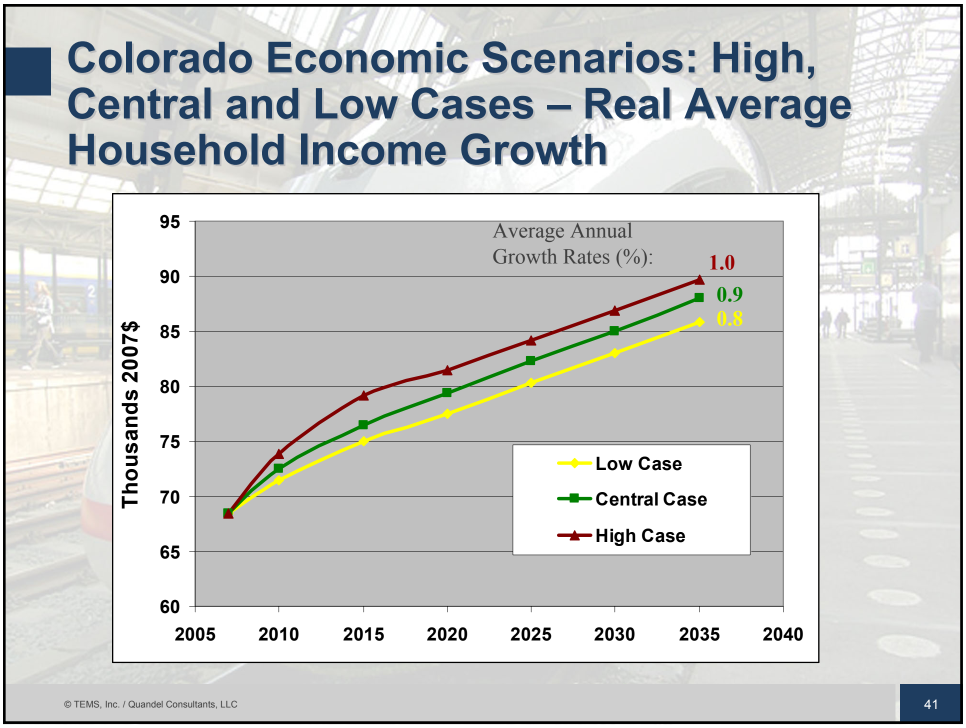


Average Annual Growth Rates (%):

2035 High-Low Range - 9%

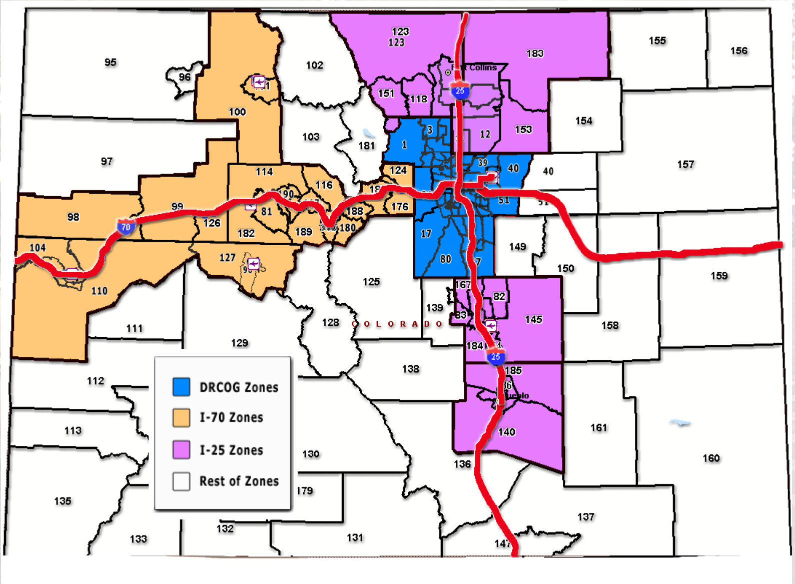


Colorado Economic Scenarios: High, Central and Low Case – Employment Growth

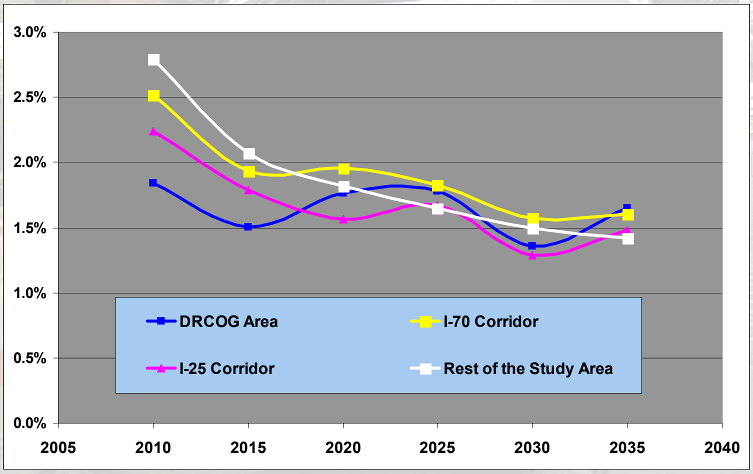


Colorado Economic Scenarios: High, Central and Low Cases – Real Average Household Income Growth

DRCOG with I-70 and I-25 Corridor Zones

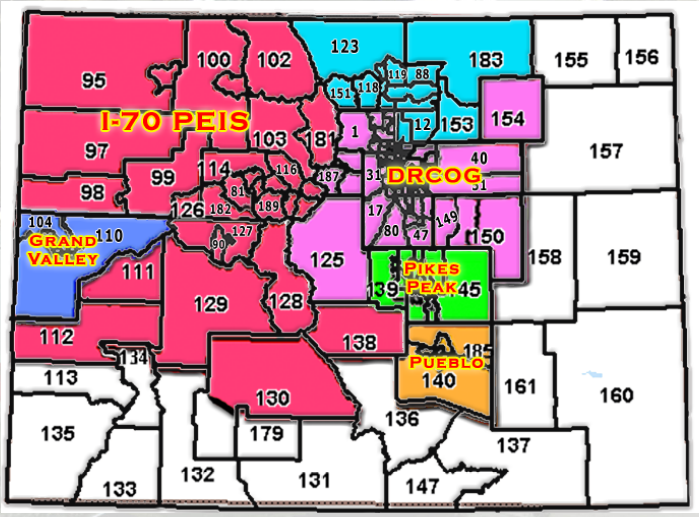


Projected Annual Population Growth Rates* by Area

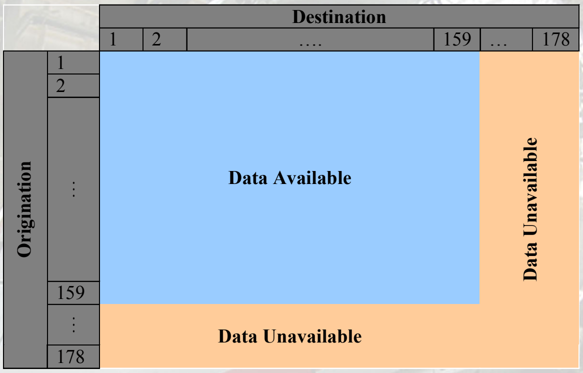


*TEMS Central Case consistent with State Demography Office (SDO).

RMRA Zone System with Available OD Data Area



Coverage of Existing Colorado Data


Destination

1 | 2 | …. | 159 | … | 178

Origination

1

2

⋮

159

⋮

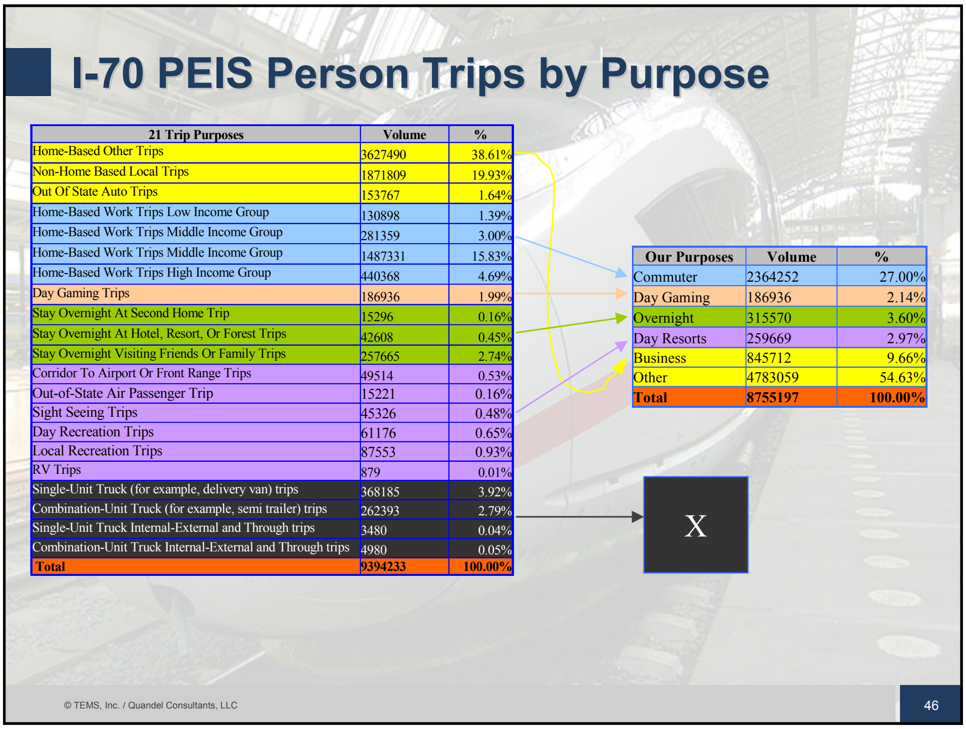
178

Data Available

Data Unavailable

Data Unavailable

	Total	Existing Data	Percentage Covered
Zones	178	159	79.79%
Population	4.9 Million	4.6 Million	93.70%
Trips	10 Million	9.8 Million	95.5%



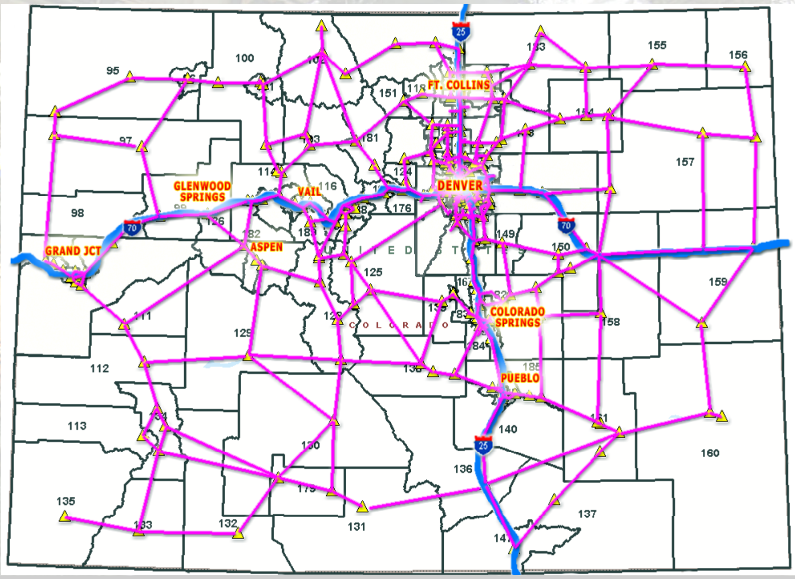
I-70 PEIS Person Trips by Purpose

21 Trip Purposes	Volume	%
Home-Based Other Trips	3627490	38.61%
Non-Home Based Local Trips	1871809	19.93%
Out Of State Auto Trips	153767	1.64%
Home-Based Work Trips Low Income Group	130898	1.39%
Home-Based Work Trips Middle Income Group	281359	3.00%
Home-Based Work Trips Middle Income Group	1487331	15.83%
Home-Based Work Trips High Income Group	440368	4.69%
Day Gaming Trips	186936	1.99%
Stay Overnight At Second Home Trip	15296	0.16%
Stay Overnight At Hotel, Resort, Or Forest Trips	42608	0.45%
Stay Overnight Visiting Friends Or Family Trips	257665	2.74%
Corridor To Airport Or Front Range Trips	49514	0.53%
Out-of-State Air Passenger Trip	15221	0.16%
Sight Seeing Trips	45326	0.48%
Day Recreation Trips	61176	0.65%
Local Recreation Trips	87553	0.93%
RV Trips	879	0.01%
Single-Unit Truck (for example, delivery van) trips	368185	3.92%
Combination-Unit Truck (for example, semi trailer) trips	262393	2.79%
Single-Unit Truck Internal-External and Through trips	3480	0.04%
Combination-Unit Truck Internal-External and Through trips	4980	0.05%
Total	**9394233**	**100.00%**

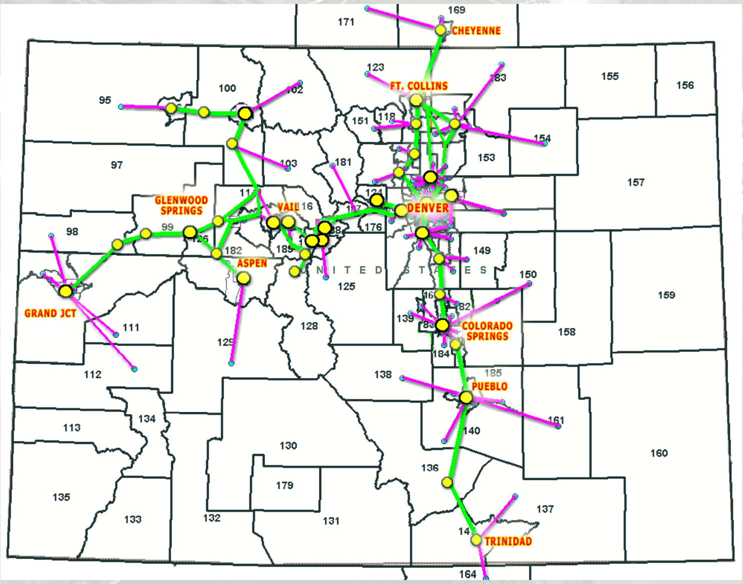
Our Purposes	Volume	%
Commuter	2364252	27.00%
Day Gaming	186936	2.14%
Overnight	315570	3.60%
Day Resorts	259669	2.97%
Business	845712	9.66%
Other	4783059	54.63%
Total	**8755197**	**100.00%**

X

Base Highway Network on Zone System



Future Rail Strategy



Thank You